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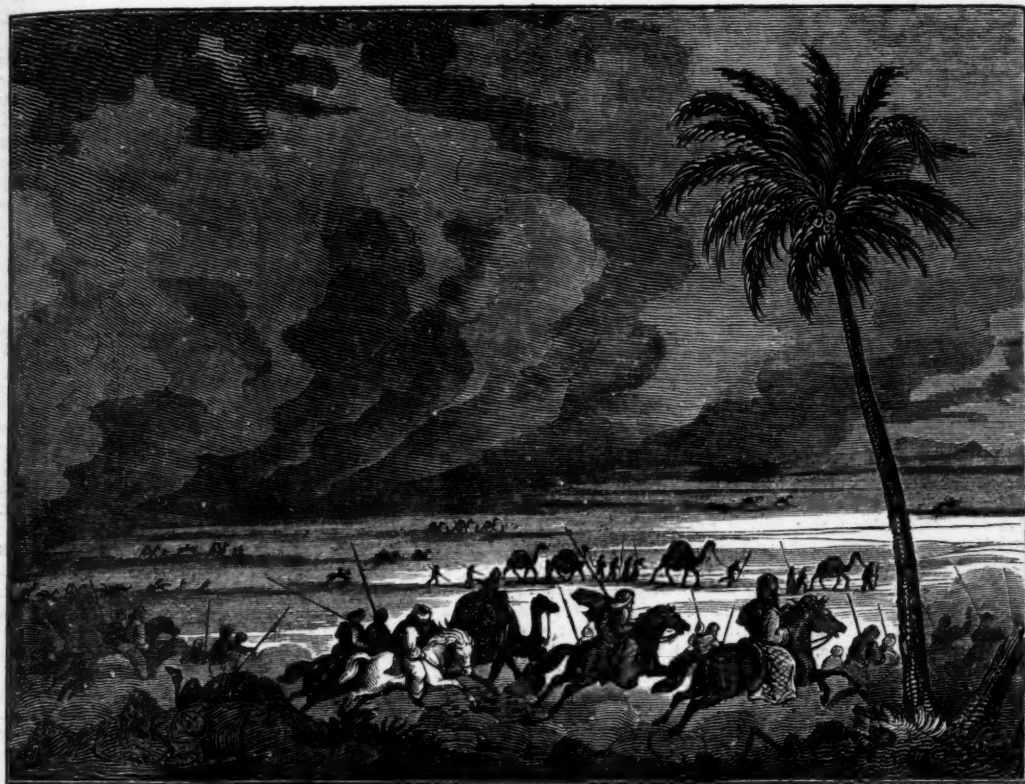
SUPPLEMENT,

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UNDER THE DIRECTION OF THE COMMITTEE OF GENERAL LITERATURE AND EDUCATION,  
APPOINTED BY THE SOCIETY FOR PROMOTING CHRISTIAN KNOWLEDGE.

## SOME ACCOUNT OF THE PLAINS AND DESERTS OF THE GLOBE.



SAND-STORM IN THE DESERT OF SAHARA.

THE science of Geography is popularly understood as treating of the division of the lands upon the surface of the earth into various empires, kingdoms, and provinces, instituted by man; and this, doubtless, forms that important part of the science which is properly termed *political, or moral, geography*. But there is another, far more extensive, more important, and more really interesting division, which treats of the *natural* history of the earth; of its *natural* divisions by seas, mountain-chains, rivers, and valleys; of the constitution of its outer crust; of the laws which govern the climates of different portions; of its animate productions; this is called *Physical Geography*, and, as it is now understood, in the true sense of the word, partly comprises the various sciences of Geology, Zoology, Botany, Meteorology, &c.

It may be easily conceived, that there can be few studies more important to man than this of *physical geography*; every endeavour, therefore, to render some of its facts more intelligible to the general reader, must be a laudable task; nor does it require any profound knowledge or deep study to be able to comprehend many of its leading principles.

When we consider the numberless differences between countries, in regard to their climate, soil, and productions, animal and vegetable, it might seem almost impossible to investigate the causes of the great diversity which really exists: investigation, however, the object of the science in question, is daily extending; and all the peculiarities are found to be mutually dependent on a comparatively few great principles.

VOL. V.

The necessarily intimate connexion between the organic productions of different countries and their climate, renders it important to explain the laws by which this connexion is governed. This is one object of the science of *Meteorology*, and in order to illustrate some parts of this paper, we must enter into a brief general notice on this subject.

If the whole surface of the earth were land, without any difference of soil, or any inequalities of level, the average temperature of the climates of different zones would decrease equably from the equator towards the poles, because the rays of the sun, by passing vertically through the atmosphere, would heat the tropical much more than the temperate regions, where the solar beams would lose some of their effect by having to traverse the air more obliquely, or to pass a greater distance through it. Temperate regions also would be much warmer than the polar, where little heat would be obtained at all from the sun, the great source of heat.

The first and most important cause of disturbance of this supposed regularity, arises from the irregular division of the surface into land and water. The ocean is of a more equal temperature throughout the globe than the land; partly because it is less easily heated by the sun's rays, and partly because of the constant mingling of its waters by the currents and the motion of the waves, these being produced by the motion of the earth on its axis, and by the analogous currents, called Winds, in the aerial ocean, or atmosphere. From these two causes, the waters of the ocean, at more than 700 feet in depth, are found to be of the same temperature all over the globe.

An island in the middle of the ocean will hence have a cooler climate than the adjacent continents, if it be situated within the Tropics, and a warmer one if it lie more towards the Poles: because, in the first case, being surrounded by a body of water cooler than the land, the temperature of the island will be reduced; and, on the second supposition, the surrounding seas being warmer than the land under the same latitude, the temperature of the island will be raised.

Thus, the islands of the Atlantic, as Madeira, the Canaries, St. Helena, &c., enjoy a moderate climate, while the centre of the African continent parallel to them, is nearly uninhabitable, from its burning heat. On the other hand, England has a higher mean temperature\* than the parts of the adjoining continent of Europe, under the same latitude; as Denmark, Sweden, and North Germany: this rule is, however, so far modified by other causes, that it is by no means of constant application. In an island the atmosphere is more moist from the evaporation of the surrounding waters, and therefore more rain falls in the year; while in some vast inland plains the air is perfectly dry, and no rain ever falls.

That the general, or mean, temperature of any country depends chiefly on the prevailing winds, is well known. It is obvious, that if the wind blows more days in the year from the north, it will cause the place to be colder, generally, than it would naturally be; and the reverse, if the usual wind comes over a heated plain or over the ocean. The prevalent wind in England is from the south-west, and the mild damp climate of our country is greatly attributable to this wind, which comes over the Atlantic Ocean, loaded with moisture and raised in temperature.

A principal cause of the average temperature of the climate of any place, depends on its elevation above the level of the sea; or on its being at a greater or less distance from the centre of the earth. The lower part of the atmosphere is the warmest, and the heat decreases as we ascend in the air, so that in every part of the globe, there is an altitude where water is always frozen. This is called the *line of perpetual snow*, because the portions of mountains which rise above this height are always snow-clad. It is obvious, that the nearer the place is to the equator, the higher into the air must we ascend, to get into the temperature which is met with nearer the earth, at places situated at a greater distance from it. At the poles, and for a great distance from them, the water at the surface of the earth is always frozen†. Hence, a plain raised many thousand feet above the level of the sea, though under the tropics, may be as cold, or colder than England, or other places in the Temperate Zones.

ASIA affords a striking illustration of these facts. The central Table-Land is the highest part of the globe of any extent; and being surrounded with mountains covered with snow, has a temperature far below that of southern Europe on the same parallel; while on passing the southern, or Himalaya chain, the traveller descending into the peninsula of India enters a tropical climate. This partly arises from the nearer position of the country to the equator, but, chiefly, from its lower level; from its being sheltered to the North by the mountains just mentioned; and from the prevailing winds blowing from the south-east or south-west.

That the character as well as the temperature of a climate, must depend very much on the quantity of rain which falls, is also obvious, and this and the vegetation of a country mutually act on each other, as cause and effect. This very interesting fact we will explain by an example, which will be more intelligible than scientific speculations.

Let us consider an extended plain of sand in any tropical country, as Africa. The sun will heat the surface and the

air, but the earth accumulating the heat more rapidly and more permanently, it will communicate to the lower portion of the air, a greater degree of temperature than it would otherwise have: and from a well-known law, this heated portion of air would rise, or ascend, and its place would be supplied with colder air coming from a distance, which would be heated in its turn, and rise, and so on, producing a constant current upwards of hot air. Now this current would prevent the clouds passing over the spot, from condensing by cold into rain, hence no rain would fall on the parched soil, and it is certain, that without moisture, little or no vegetation can be produced.

But if we suppose the same plain to consist, instead of barren sand, of some earth favourable for the growth of grass, or moss, or any verdure, this would screen the earth from the accumulating heat. Little or no upward current would arise, clouds would be condensed in the higher regions, and rain would fall, or at least, the vapours would be condensed by the colder vegetable clothing, and this dew would accelerate the growth of fresh plants, till in time, a forest might cover the former naked expanse. These trees would still further shade the earth, and preserve its moistened surface from evaporation, and would also attract moisture, and consequently keep down the temperature of such a country.

When, however, a sandy plain is surrounded by lofty mountains, a quantity of water is always collected from the atmosphere by their summits, and naturally descending their sides, irrigates the plain by rivers, which counteract the aridity that would otherwise accompany it; or if not abundant enough to form rivers, at least forms springs, as is the case with the Oases of Africa. (See p. 39.)

It is very difficult to ascertain or to be aware of the difference of level of adjacent countries, by simple ocular inspection. A valley intersecting a plain, is obvious to every one traversing it, but if a person ascend a chain of hills rising from a plain, on descending on the other side he cannot immediately tell whether he is come down to the same level as the plain, or whether he is above or below it.

We all know that the land, generally, must be higher than the level of the sea, or the sea would overflow it and we know that the land is not equally high, because we see it shelve down to the shore in some parts, or form very steep cliffs in others, while we see valleys and mountains varying it on all sides. Few persons, however, are aware, that the difference in the level of extensive regions is so great, that while the Table-Land of Asia is raised 10,000 feet above the level of the sea, there is a vast extent, of about 18,000 square miles, in the neighbourhood of the Caspian Sea, that is absolutely below the level of the ocean.

It is now known, that in the course of many ages, great revolutions in the surface of the globe are brought about by the slow, but constant, wearing down of all the elevated parts, by the action of water, and also through the elevation of new islands and continents from the bottom of the deep by earthquakes‡. There is conclusive evidence of the greater part of Europe having been raised from the deep, since the existence of other more ancient countries.

Now, if we suppose a large tract of the bed of the ocean to be gradually raised till it forms dry land, it will for many ages present the appearance of a level tract or plain, and such is probably the origin of most of those extensive deserts, steppes, plains, &c., which are found in different parts of the world.

We purpose, in this paper, to give a popular account of some of these, since they are less known from their being comparatively uninhabited, and little visited; and the varieties in their appearance and their productions, with the few common points of resemblance, will afford a useful and entertaining lesson, and enable us to judge of the inexhaustible fund of amusement and of knowledge which Physical Geography presents.

We shall commence with the plains in South America, called

#### THE LLANOS.

At the foot of the lofty range of mountains in the province of Caraccas, there lies a vast plain, stretching southwards

\* In all countries there is a summer and a winter, or a difference of seasons; the former being hotter from the greater length of the day, or of the time the sun is above the horizon, and therefore acting on the land and air: the mean annual temperature is the average of these different temperatures, as found by repeated observations; and is that, nearly, of the spring or autumn of the year in each country. The summer-heat on the continents is greater, and the cold of winter more intense, than on an island; the former are said to have an excessive climate, and the latter an insular climate; yet the mean temperature of a place on the continent, may be the same as one on an island in the same latitude. The reader must bear all these facts in mind, and he will perceive that it is impossible to give any general rule on this subject.

† It has been calculated, that the mean temperature of the equator round the globe is about 85°, and that at the poles is -10°, or ten degrees below zero, water freezing at 32° above zero. In the tropics, the line of perpetual snow is at about the height of 16,000 feet above the sea: in latitude 45°, (that of Venice and South Europe,) it is at about 6000 feet.

‡ This theory has been advanced and maintained by Professor Lyell, in his recent work, *Principles of Geology*, with such power of reasoning and extent of knowledge as will, we are convinced, cause a new epoch in the science of Geology. We may here, once for all, acknowledge our obligations to that work, for many of the principles and facts in any way connected with that science which have appeared in the Supplements of this Magazine.

far beyond the limits of the visible horizon. The contrast presented on leaving the fertile, undulating valleys of that country, and the shores of the lake of Tacaragua, dotted over with islands covered with luxuriant vegetation, is indescribable. The traveller quits a beautiful tract, covered with the palms, sugar-canes, &c., of a tropical land, to enter on a barren desert. No hill, no elevation, disturbs the monotony of the scene, except here and there flat banks, so called by the natives, raised only a few feet above the general level, but, from their slight elevation and their great extent, hardly distinguishable. These are sometimes two hundred square miles in extent, and appear like islands in a waveless sea.

That this plain was once the bottom of an ocean, there is conclusive evidence, from those facts which speak more decisively than any historic human records; and at that time the banks formed shoals analogous to those in our present seas. The observant and scientific traveller has his imagination carried back to this primeval period, by an optical illusion presented to his view. When at night the eye ranges over the level tract to the extreme limit of vision, the level line which forms the horizon reminds him of that of a tranquil ocean\*, and the stars as they rise or set, are absolutely reflected in the stratum of air that lies on the earth, as if seen in real water. This phenomenon arises from the same causes which produce the *mirage* of the desert, in day time; that illusion which mocks the thirsty and fainting traveller with the appearance of lakes of water, when journeying over hot sandy plains.

But the real ocean, with its associations, is a pleasing, though sublime object, while the "Llanos" of South America lie stretched out before the eye, like the naked rocky crust of a worn-out planet. The interest they excite is of a peculiar kind, and arises only from their natural history. Unlike the deserts of Africa, they contain no *Oases* to recall the mind to earlier races of inhabitants; no carved monuments, no ruins, to suggest the idea of a past age of glory and renown; no fruit-trees run wild, to indicate that the diligence of past generations was exerted to provide food for their population. This portion of our globe seems estranged from all human interest; a wild arena for unfettered animal and vegetable existence.

The Llanos extend from the mountains on the coast of Caracas to the forests of Guayana; from the snowy mountains of Merida to the great Delta of the Orinoco; in a south-westerly direction, they stretch, like an arm of the sea, from the rivers Meta and Nichada, to the unfrequented sources of the Guaviare, comprising a surface of about sixteen thousand square miles. Though thus close to the equator, yet, from the physical geography of this continent, they do not resemble the Sahara of Africa in constant barrenness, but, during one half of the year, are covered with grass, like the Pampas of Buenos Aires, or the Table-Lands of central Asia.

The causes of the lower temperature and greater moisture of the climate of equinoctial America, compared with that of Africa, are to be found in the peculiar form of this part of the globe. Narrow, and much indented with seas and bays within the northern tropic, it presents but a comparatively small surface to the action of the sun's rays; while the great expanse towards the North Pole; an open ocean, over which the tropical winds come; the flatness of the eastern coast; the stream of cold sea-water which flows from Terra del Fuego along the Peruvian coast; the number of mountain-chains rearing their snow-covered summits far above the clouds; the multitude of enormous

rivers; impenetrable forests, occupying the equatorial regions where the land is most extended; all concur to keep down the heat and aridity of America, compared with the African peninsula, which is diametrically opposed to it in all these characteristics. These peculiarities are sufficient to explain, why Africa and South America present the most opposite character of climates, and the most different features of vegetation.

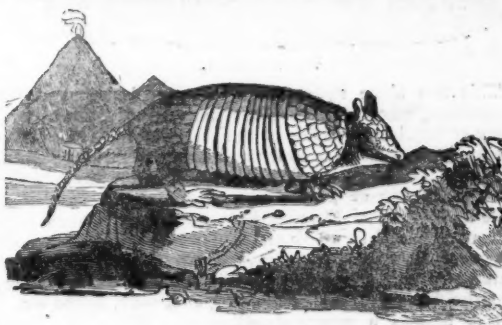
Though the Llanos are covered with a thin coating of fertile earth, and are periodically flooded by rains, so that they are decorated with luxuriant verdure; yet the neighbouring native tribes have never been enticed to leave the lovely valleys of the Caracas and the coast, or the shores of the Orinoco, to settle in these wastes. On the first arrival of European and African settlers, these deserts were found nearly destitute of inhabitants. The Llanos are now especially appropriated to rearing cattle, though the management of animals yielding milk fit for human food was unknown to all the aborigines of the new continent.

Two kinds of native cattle pasture in the grass-plains of West Canada as well as in Mexico: the long-horned mouflon, the original stem of the sheep, abounds on the dry, naked, calcareous rocks of California; and the camel like vikunnas, alpacas, and llamas, are peculiar to the southern continent. Except the last, all these useful animals have preserved their natural freedom for thousands of years, the employment of milk and cheese as articles of food, like the culture of farinaceous grasses, being a characteristic distinction of the people of the old world.

Since, therefore, as it appears, the shepherd's life, that beneficial middle-state which fixes the wandering hunter tribes to the meadows, and prepares them for the pursuits of agriculture, was unknown to the original inhabitants of America, it is to this circumstance, that the absence of population in the Llanos, on their first discovery by Europeans, must be attributed. Hence appears also a variety of animal forms which have remained in a state of nature, uncontrolled by the presence of man.

Each continent of the globe has animals peculiar to it; many are only different *species* of genera found elsewhere; but there are many *genera* of animals peculiar to South America; though these are not so strikingly different from the animals of the old world, as those of New Holland are from the animals of all the rest of the world.

In the Llanos are found, the *agouti*, of the same order as the guinea-pig, rabbit, porcupine, &c.; it is about the size of a hare, and has many of its habits. The *armadillo*, a singular animal, having a scaly hard shell, which is



THE ARMADILLO.

flexible enough to give full scope to its motions, and is yet a secure defence from most enemies, belongs to the same order as the sloth, the ant-eater, &c., and lives on vegetable food, and burrows in the ground. The *chiguire* or *capybara*, another animal of the guinea-pig tribe, and the largest known; lives in herds on the banks of rivers, and feeds on fish and fruits. The *chinch*, a species of marten, like our European pole-cat, possesses, but in a much greater degree, the power of defending itself, by emitting an odour, so intolerable, as seriously to affect men or animals exposed to it. Another, the *mariputa*, dwelling on the banks of the Orinoco, is protected from the jaguar, its chief enemy, by the virulence and fetidness of the effluvia which it emits.

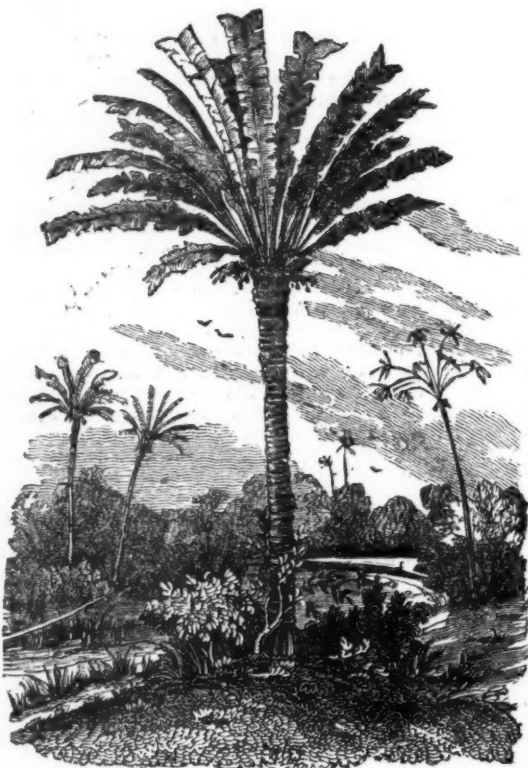
Of the more formidable animals, the *puma*, or American lion, must be mentioned first; but both this, and the

\* That this effect of resemblance to a sea is not exaggerated, is proved by the evidence of Captain Hall, when speaking of another extensive plain,—a very conclusive authority on many subjects.

"Some of these singular places" (the prairies on the banks of the Mississippi,) are nearly level, others have a gently swelling or rolling surface. The grand prairie of the Illinois has specimens of both kinds, but its general character is level, with a few clumps of trees, and these far between. The resemblance to the sea which some of the prairies exhibited was really most singular. There is one spot in particular, near the middle of the grand prairie, where the ground happened to be of a rolling character, and where, excepting in the article of colour,—and that was not widely different from the tinge of some seas,—the similarity was so striking that I almost forgot where I was. This deception was heightened by a circumstance which I had often heard mentioned, but the force of which none but a seaman could fully estimate; I mean the appearance of the distant insulated trees as they rose above the horizon, or receded from our view: they were so exactly like strange sails heaving in sight, that I am sure if two or three sailors had been present they would almost have agreed as to what canvass these magical vessels were carrying.—*Travels in North America*, vol. iii.

jaguar, and other alien species, are well known to Europeans, from being seen in most menageries. These are but a few of the multitude of living creatures that swarm on these plains.

Nearly uninhabitable except to such animals, these plains would never have arrested the steps of those tribes who, Indian-like, prefer vegetable food, were not the *Mauritia*, or Fan-palm, found scattered over them here and there. The benefits of this important plant are widely known: the stem attains a height of five and twenty feet, in about 120 or 150 years, and they form lovely groups of brilliant green in moist spots, something as our alders do. They preserve by their shade the humidity of the ground, and hence the Indians maintain, that the *Mauritia* mysteriously attracts water to its roots\*.



THE FAN-PALM.

This tree alone supports the unsubdued nation of the Guaraunes, who dwell near the mouths of the Orinoco. They suspend mats made of the stalks of the leaves with great skill from stem to stem; and during the rainy season, when the Delta† is overflowed, they reside entirely in the trees by means of these mats, as completely as if they were apes. These hanging huts are partly covered over with clay: the fires for domestic purposes are lighted on the lower story, which is always damp from the subjacent water, and the traveller by night, in sailing along the river, sees the flames in rows, suspended, as it were, in the air.

But besides a secure dwelling, the *Mauritia* affords them food also; before the blossoms‡ of the male tree burst their delicate *spathes*, or sheaths, and at that period alone, the pith of the stem contains a sago-like kind of meal, which, like Cassava, is dried in thin cakes. The sap, when fermented, becomes a sweet, intoxicating wine; the fruit, which is reddish, resembles a pine-cone in form, and affords, like the Pisang, and most fruits of the tropics, a varied nourishment in its different stages. Thus we find,

\* By an analogous fallacy, mistaking cause and effect, they protest against the destroying of snakes; because they say the lagunes dry up when these reptiles are removed. The *Mauritia* thrives only where moisture collects, and the serpents only frequent the stagnant ponds.

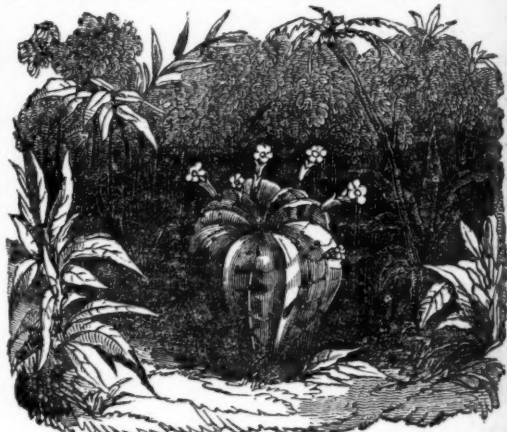
† When a river empties itself into the sea by several mouths, these form a triangular figure, and the plain through which they run is called the *Delta* of the river, from the name of the Greek letter Δ, which is of a triangular form.

‡ Many *Pams* are what botanists term *diœcious*; that is, have the male and female flowers distinct from each other, on separate plants.

in the lowest scale of human cultivation, a whole race dependent on a single plant, as certain insects are confined to one part of a flower.

The discovery of the New World by the Europeans, has, of course, altered this scene; and these plains are now become inhabited. Towns are built, here and there, on the banks of the rivers, for the sake of facilitating the intercourse between the coast and Guayana, while others, in the interior, are the abodes of families who rear cattle, as is now every where done on these boundless wastes. These villages, for they deserve no higher denomination, lie sometimes several days' journeys apart, and consist of rude huts, constructed of stakes and reeds woven together, and covered with hides. Horses, mules, and cattle, left to run wild, in innumerable troops, roam over the steppes. The incredible multiplication of these animals, since their introduction from the Old World, is the more astonishing, when the manifold dangers and privations to which they are exposed in that country, are taken into consideration.

When the vertical rays of the ever-cloudless sun have withered up the grass to dust, the hardened earth opens as if shaken by an earthquake. If the surface is then acted on by opposing currents of air, a singular appearance is presented on the plain. Funnel-shaped clouds of sand rise from the ground, in the middle of the vortex, analogous to the water-spouts so formidable to the mariner on the ocean; a troubled straw-coloured light is thrown from the sky, which seems as if it had come down nearer the earth; the horizon appears to approach, and contributes still more to bewilder the traveller, caught in this commotion: the air, filled with sand, augments the usual heat, the east wind comes, heated by contact with the glowing earth, and brings any thing but refreshment§. The small pools of water, hitherto protected from evaporation by the shade of the Fan-palm, are at length dried up; as, in the north, animals become torpid from excess of cold, here the contrary cause produces a similar effect, and the crocodile and the boa lie buried deep in the hardened earth. Here, also, the deceitful *mirage* allures the beguiled wanderer the horses and cattle, tormented with burning thirst, and bewildered by the clouds of sand, run around neighing and bellowing with outstretched necks, snuffing the wind, to detect, by the slightest moisture in the current, some distant pool, which has escaped the effects of the heat. The mules, with more apparent foresight, seek alleviation from the *Melon-Cactus*, which contains a juicy and refresh



THE MELON-CACTUS.

ing interior beneath its hard and prickly bark; they strike aside the prickles with their fore-foot, and then with great

§ It has been computed that 1,200,000 oxen, 180,000 horses, and 90,000 mules, wander at large in the plains north of the Orinoco; and in the Pampas that there are 12,000,000 cattle and 3,000,000 horses;—all these sprang from the few individuals carried over by the Spaniards on their first settling! The horned cattle are principally valuable for their hides and tallow; 800,000 are annually exported from Buenos Aires and Monte Video alone.

¶ These clouds of dust are especially frequent in the Peruvian sandy plains, between Amotape and Coquimbo; they would be very fatal to travellers, if not avoided when seen approaching. What appears remarkable is, that these partial whirlwinds always arise during a general calm; in this, also, the analogy between the ocean of air and the ocean of water is preserved; in the latter, small streams, in which the rippling is distinctly audible, are often observed during a dead calm. Electricity is the primary cause of all these phenomena.

precaution apply their mouth to the plant. But so formidable are the guards with which nature has furnished this reservoir, that animals are often seen lamed in the hoof from this cause.

When night comes on after the burning day, and brings a diminution of temperature, the persecuted animals are not allowed to enjoy this alleviation; enormous bats attack them during sleep, and suck their blood, or hang to their coats and form wounds, in which mosquitos, gad-flies, and a multitude of insects, deposit their eggs, and convert them into festering sores. Thus, during the dry season, the larger quadrupeds lead a life of ceaseless misery in these regions.

On the approach of the rainy season, the whole scene is quickly and strangely changed: the deep-blue of the ever-cloudless sky becomes lighter; at night, the black spot in the glorious southern constellation of the cross is hardly perceivable: the soft phosphorescent glimmer of the magellanic clouds is extinguished, and even the vertical stars of the eagle and ophiuchus, shine with a tremulous and less planet-like light\*. A few solitary clouds first appear, like distant mountains in the south; vapours spread themselves like veils across the zenith, and the distant thunder announces the approach of the refreshing rain.

Scarcely is the surface of the earth moistened, when the reeking grounds are overspread with *Kyllingia*, *Paspalum*, and other sedges and grasses; herbaceous *Mimosæ* unfold their leaves, and, together with the early song of birds, and the opening flowers of the water-plants, salute the rising sun. The horses and cattle now revel in the perfect enjoyment of existence, though the beautiful spotted jaguar lurks in the tall herbage, and darts, like the eastern tiger, on the unwary animal.

According to the natives, the moistened shores of the ponds are occasionally seen to rise and break into clods, which are cast, with a noise like that of a mud-volcano, into the air. The prudent spectator, aware of the cause, hastens from the place; for a gigantic water-snake or a fearful crocodile rises from the pit, aroused from their torpor by the first gush of rain.

By degrees, the rivers which form the southern boundary to the plains, the Arauca, the Apuré, and the Payara, overflow their banks, and the same animals which, in the preceding half year, fainted from thirst on the parched and burning soil, are now compelled to live as amphibious: one part of the steppes becomes a vast lake, navigable for large vessels, which can sail ten or twelve miles together straight across the country. The mares withdraw with their foals to the higher banks, which again resume their character of islands; but with each day these dry spots diminish, and at last, from want of pasture, the crowded horses are seen swimming about for hours together, seeking a scanty food from the flowering grasses which still rear their heads above the brown turbid waters. Many foals are drowned in consequence, and many are seized by crocodiles, or struck and disabled by their serrated tails: not unfrequently cattle and horses are afterwards seen, who have escaped from these monsters, and carry on their limbs the marks of the sharp teeth of these blood-thirsty lizards.

This appearance reminds the thoughtful observer of the power of conforming with exterior circumstances with which Nature has endowed, in common with man, certain species, both of animals and plants. The horse and the ox, like the farinaceous grasses, have been carried by him over the whole earth; from the Ganges to the Plata, from the

African Coast to the Plains of Antisana, which are higher above the level of the sea than the summit of the Peak of Teneriffe†. Here the northern Birch, there the Date-Palm, affords a shelter from the noon-day sun to the animals of which we have been speaking. The same genus which, in North-eastern Europe, combats with wolves and bears, is exposed in another hemisphere to the attacks of tigers and crocodiles!

But it is not only from these enemies that the herds and troops of cattle and horses are exposed to danger, they have a fearful foe among the fish. The stagnant lakes of Bera and Bastro are filled with innumerable electric eels‡, which possess the power, at pleasure, of sending a very powerful shock from any part of their slimy yellow-spotted bodies; they are five or six feet long, and possess this extraordinary faculty in sufficient power to kill the largest animals if they can discharge their organs at once, and in the most favourable direction. At one time they existed in such numbers in one of the water-courses of the road from Uritucu, that every year many horses, stunned by their shocks, were drowned in crossing the ford. All other fish fly the neighbourhood of this formidable eel; and the angler, on the bank, is often startled by a shock conveyed to him along his moistened line§.

THE comparative efficiency of the deserts and steppes of the globe, as barriers between the adjoining countries, is proved by the great difference which exists in the physical and moral characters of these contiguous lands.

Africa's northern deserts separate the two great human races, which, originating from a common home, have long been at variance, and whose discord has been the subject of mythology, under the fabled strife of Osiris and Typhon. North of Mount Atlas dwell the smooth, long-haired people, of tawny complexion and Caucasian features; southwards, on the contrary, from Senegal towards Soudan, Negroes alone are found, in various stages of improvement.

In middle Asia, the steppes of Mongolia divide Siberian barbarism from the earliest seat of human cultivation in the Indian peninsula.

In South America, the Llanos and Pampas limit the extent of European half-civilization, which has more recently been introduced there. North, between the mountain-chains of Venezuela and the Caribbean Sea, thriving towns and cheerful villages crowd on each other, and a taste for the arts and intellectual improvement, as well as their necessary result, the noble zeal for civil freedom, are now aroused. Towards the south, a gloomy wilderness surrounds the steppes; forests thousands of years old, an impenetrable thicket, fill the marshy territory between the Orinoco and the Amazon; mighty masses of granite narrow the bed of the foaming streams; mountain and forest re-echo the thunder of the cataract, combined with the roar of the tiger and the dead howl of the bearded ape. Where the shallower waters leave a sand-bank dry, the body of the lurking crocodile is seen lying, its jaws opened to seize its prey, and so motionless that it is often covered with birds, who perch on it. The spotted boa, with his tail wound round a branch of a tree, and his long body doubled together, watches the opportunity and darts on some young bull, or a more feeble deer, as it approaches the bank, and, after smearing the body with its venomous saliva, sucks it in slowly and with effort through its distended throat and neck||; and then lies for weeks overcome with the mass of food, till it is digested, and hunger again compels it to seek a new meal.

\* These various appearances are the results of increasing moisture in the air, and therefore precede the rain. The drier the atmosphere, the deeper the blue of the sky; hence, the intense azure of that of tropical climates. English travellers are even struck with the great difference between their native sky and that of Italy in this respect. An instrument has been contrived by which the depth of blue has been measured, and meteorological observations are made with it; it is called a Cyanometer, (blue measurer.) As the moisture increases, distant objects become more obscure and faint; and the heavenly bodies, therefore, are not so bright. The spot in the Cross is an astronomical phenomenon on which scientific men are not agreed; it appears much darker than the rest of the sky, and, therefore, just the reverse of those apparent clusters of stars which compose what are called Nebulae, the Milky-way, and the Magellanic clouds. Most of our readers are familiar with Capt. Hall's eloquent description of the effects of seeing the constellations of the southern hemisphere, as they gradually rise above the horizon, in sailing; and especially the feelings excited by the Cross, the sign of our salvation, planted by God in the heavens as a beacon to man.—See *Saturday Magazine*, Vol. III., p. 139.

† The pressure of the atmosphere is hence so much diminished on these plains, that when the wild cattle are baited by hounds, blood issues from their nose and mouth.

‡ *Gymnotus Electricus*; it belongs to a very different section of the class, to that of the eel (*Muraena*) properly so called.—See *Saturday Magazine*, Vol. IV., p. 144.

§ The identity of Voltaism, or Galvanism, and electricity is well known, the action of the former species of these two divisions, is supposed to exist, in a latent state, in all organized matter, where dissimilarly constituted parts are in contact, and appears to be intimately connected with the phenomenon of vitality, as well as with almost every one of the physical world.

|| The saliva with which this serpent covers its victim accelerates putrefaction, the muscular part becomes softened like jelly, and enables the reptile to swallow whole limbs at a time. When swimming in the Orinoco, they raise their head above the water like a dog; they occasionally attain a length of forty-five feet as it is said, but the largest skin ever brought to Europe has not exceeded two and twenty. The American serpent (a python,) is a distinct species from the East Indian.

VARIOUS races of natives inhabit this grand and wild scenery, separated by a decided difference of language. Some lead a wandering life, ignorant of agriculture, and living on ants, gums, and even earth, like the Otomaks and Jaruren, the outcasts as it were of mankind.

While the Orinoco and the Meta flow between their banks, these tribes live on fish and turtle; they kill the former by arrows when they rise to the surface, and are very expert in the use of their weapon for this chase. As soon as the river begins to rise, the fishery ceases, and during the floods, which last two or three months, these Otomaks consume enormous quantities of earth as food; large stores are kept in their huts, ready prepared by baking, in pyramidal heaps of balls\*; and the Missionaries state, that one man will eat from three quarters to a pound and a quarter of it in a day. According to their own avowal, this clay is their principal food during the rainy season, occasionally adding a lizard or a small fish if they can obtain either, or a fern-root; but they are so fond of this strange diet, that, even during the dry season, when they have an ample supply of fish, they daily swallow some of the clay after a repast, by way of a treat. They are of a dark copper complexion, with disagreeable Tartarian features, robust, but not with prominent bellies, as most savages, and they appear to undergo little diminution in flesh during the season of their earth-diet, nor does their health appear at all injured by it†.

Other tribes, like the Maquiritars and the Makos, are more cultivated, consume fruits raised by themselves, and have fixed abodes in consequence. But large portions of territory between the Cassiquiare and the Atabapo, are tenanted only by the tapir and the gregarious species of apes; yet in these deserted plains, images carved in the rocks, show that at some former period they were the abodes of more cultivated races than any now bordering on them, which, generally speaking, are in the lowest scale of human existence, and quite incapable of executing any such sculptures.

Among the present degraded races, the most violent passions, as might be expected, reign without control. Whole races drink the blood of their enemies, and others more skilled than all civilized mankind ever are in the knowledge of vegetable poisons, have their thumb-nail dipped in a most violent one‡, always ready to inflict the mortal wound on any enemy whom they can surprise. The weaker tribes, when migrating, are compelled, for self-preservation, to obliterate with care their footmarks, in order to foil their relentless and ingenious pursuers.

### THE PAMPAS.

SOUTH AMERICA contains another plain three times as extensive as the Llanos, if not so interesting from its productions. This plain, called the *Pampas*, lies on the

\* "On the 6th of June, 1800, on our return from the Rio Negro, when we descended the Orinoco, we passed a day in a mission inhabited by the earth-eating Otomaks; the village was called La Concepcion di Uranua, and was picturesquely situated against a granite rock. The earth which this people devour is an unctuous mild clay, true potters'-earth, coloured yellowish-gray by a little oxide of iron; it is carefully selected for use, and is found on some banks on the shores of the Orinoco and Meta. They distinguish one kind of earth from another by the taste, for all clay is not equally agreeable to them: they knead the earth into balls of from four to six inches in diameter, and toast these before a slow fire till the outside becomes reddish; when wanted they are again softened in water. These Indians are very wild, and averse from all agriculture: it is a proverbial expression among the farthest nations of the Orinoco, in designating any thing very filthy, to say, 'so dirty that the Otomaks eat it.'—HUMBOLDT.

† To the physiological question, whether, or in what way, this simple earth can supply the place of food, there is, at present, no decided satisfactory answer, but it is a well-known fact, that every where within the Tropics, men have a singular and unconquerable craving for swallowing earth at times. The Indian women engaged in the potteries on the Magdalena, often eat a portion of the clay on which they are at work, but all except the Otomaks suffer in their health severely, by the indulgence of this propensity. The negroes brought to the West Indies during the prevalence of the slave-trade, always endeavoured to obtain a kind of clay, similar to what, as they said, they had been accustomed to eat with impunity in their own country; but the practice was forbidden, from finding that they were injured by it, and the earth was consequently only sold secretly in the markets. According to the accounts of different travellers, a similar taste is found in many parts of tropical countries.

‡ This poison is called *curare*, and is obtained from an unknown plant, but belonging to a genus which is very poisonous; the single seed of one species is sufficient to kill twenty persons.

eastern side of the Andes, and extends from their foot to the Atlantic. Captain Sir F. B. Head, who journeyed over this immense expanse in 1825, has given the latest, and by far the most interesting account of it; and from his work we shall principally take our notice.

The Pampas are about nine hundred miles in breadth; and in the same latitude, that of Buenos Aires, are divided into three very distinct regions. On leaving Buenos Aires, the earth for about one hundred and eighty miles is clothed with large thistles and clover; for the next four hundred and fifty, the plain presents nothing but long grass, and the remainder, to the base of the Cordillera, is covered with evergreen trees and shrubs; the two latter divisions are little changed during the year, the grass only becoming more brown from the summer-heats, but the district of thistles varies in a singular manner. In winter, the country looks like a vast turnip-field, the clover is luxuriant, and the herds of wild cattle grazing in unrestrained liberty, present a beautiful scene. The clover disappears as spring advances, the thistles gain the ascendancy, and attain an altitude of ten or eleven feet; forming a forest impenetrable to man or beast by their strong and prickly stems and leaves; the road through them is hemmed in on each side, cutting off all view, and so rapid is the growth, and so effectual the barrier, that Captain Head says, it is not impossible that an army might be completely surrounded by them and imprisoned, before it could escape. Dried and withered by the increasing heat, this forest yields at last to the periodical hurricanes that sweep over the plains; it lies strewn along, fertilizing the soil anew by its decay, and the succession is renewed by the re-appearance of the clover-crop.

The grass and woody regions, though less varied, are not less beautiful; the former seems to be without a weed, and in the latter such order exists in the growth of the trees, that a rider may gallop between them in every direction.

The climate of the Pampas, like that of all continents, is varied by intense heat during the summer, while the winter is about as cold as November in our latitude; but the effects occasioned by the difference in the moisture of the atmosphere, is the more striking feature in the regions of wood and grass. Owing to the level nature of the country, its distance from the ocean, and other causes, the air is so dry, that dead animals dry up in their skins on the plains, as they do in the great deserts of Africa. There is no dew at night in the hottest weather: on the contrary, in the first, or eastern region, the air is excessively damp, animal decomposition after death is rapid, the walls of the houses in Buenos Aires are so damp, as to make them disagreeable, and sugar, salt, &c., can hardly be kept from dissolving; but it does not appear that even this part is unhealthy in consequence, so that on the whole, the climate of the country is beautiful and salubrious.

Like the Llanos, there are few fixed residents on these fertile plains; the native Indians wander in tribes from place to place over the southern part, and a few straggling towns and huts, the residence of the keepers of enormous herds, are widely scattered over the rest. The impolicy of the Spanish government having prevented the natural advantages of the country from being available, the want of good navigation and of a harbour on the coast, are impediments to the progress of cultivation.

The inhabitants of these isolated residences, descendants of Spanish settlers, are termed *Gauchos*, and live a monotonous life in the hut inhabited by their predecessors. It consists of one room, in which the whole family reside promiscuously; a shed serves for a kitchen, and about fifty or a hundred yards off, is a circle of thirty yards, enclosed with strong posts, in which the cattle are penned for slaughter, and which, consequently, is strewn with bones, carcasses, horns, and skins of bullocks and horses, while on the fence are perched vultures attracted by the stench, and overcome with gorging on the carrion.

The food of these people consists solely of beef and water, and inured from their infancy to fatigue in riding, for they never walk, they are hardly and healthy. Their principal occupation is to catch and kill cattle, and their principal accomplishment, the use of the *lasso*, to which they are trained from an early age, children being always seen lassoing the dogs or wild birds; the use and nature of this lasso will be presently explained.

It appears that the indifference to the conveniences or even the necessities of civilized life, which characterizes the Gaucho, however philosophical it may appear at first

as the result of contentment, leads to the usual consequences of moral degradation\*.

There are no regular roads, of course, through these plains, and the mode of travelling is extraordinary. A rude carriage is prepared for the journey, by having strips of soaked hide bound wet over every part of its wheels and frame; this, on drying, contracts and becomes as hard as wood, and will endure a course of seven hundred miles without being cut or worn through; horses are harnessed by a single rope from the saddle, and each mounted by a peon, or postilion: the vehicle is dragged at a full gallop across ditches, lakes, and over all obstacles. At the end of a stage the riders unhook their animals, and set off to catch other fresh horses from the enclosures near the buildings which serve as post-houses, and the immense troops of horses produced in the country, prevent any delays from want of fresh relays; but the mode of riding is cruel in the extreme, the sides of the horse are streaming, and the heels and legs of the riders are literally bathed in blood.

Those who, like the Gauchos from youth, are inured to it, or who can stand it, prefer, however, to ride, instead of using these vehicles. Captain Head gives an animated account of the effects of his journey on horseback across this country and though at first, suffering from the fatigue of riding one hundred and fifty miles a day, at a full gallop for weeks together, yet he states that when broke in to it, and strengthened by the temperate yet invigorating diet of beef and water, to which a prudent traveller prefers trusting, in preference to encumbering himself with luggage and provisions, it causes no permanent injury to the health, and is a very exhilarating and pleasant mode of life.

One constant source of danger in riding over the Pampas, arises from the holes like rabbit-holes, made by an animal called the biscacho†, or viscacho. When full grown, they are nearly as large as badgers, their head is like a rabbit, but they have large bushy whiskers. In the day-time they keep in their burrows, and are only seen to come forth at sunset; but what appears extraordinary regarding these animals and their dwellings, is, that in the day time, two small owls sit at the mouth of the holes, into which they retire on the approach of any danger: the same thing is said to occur in the prairies of North America, with respect to the animal called the prairie dog‡. The fact is, the bird is a variety of the burrowing owl (*strix cucularia*), which to save the trouble of making a retreat for itself, takes possession of the deserted holes of the viscacho, and like the snake mentioned in the note, has no other connexion with the quadruped. This bird belongs to a division of the family (owl,) which can see as well by day as by night, and this species not being savage, likes to sit at the door of its house and see what is going on in the world.

The puma, or American lion, a species of ostrich, the gama, the Patagonian cavy, are among the principal indigenous animals of the Pampas.

In one part of the country, Captain Head found locusts so numerous as to cover the ground. At one of the posts a woman was sweeping them away with a broom, and they swarmed in crowds up his horse's legs; he placed his straw hat on the ground while he was drinking some water, and on going to resume it, it was covered with these insects biting the straw.

The method of taking the wild cattle and horses by the lasso is singular; this is a long line made of thongs of leather, and having a running noose at one end. The gaucho, or peon, being mounted on a well-trained horse, holds the lasso coiled up loosely in his right hand, but without any risk of its entangling; the other end is fastened by a hook to the saddle. When he has approached sufficiently near the animal he has selected, he throws the lasso, and with such unerring aim, acquired by long practice, that the noose falls on the neck or round the horns. On feeling the strange incumbrance, the ox gallops off, the man

immediately turns his horse round, and causes it to lean on the opposite side from the course of the ox, so that when this is stopped by the lasso being run out, the horse may be able to resist the sudden jerk; this often, however, draws him sliding on all four feet for some yards; but more commonly the ox, as being unprepared for the check, is thrown down, and affords time to the hunter to secure him by either dragging him along the ground before he can rise, or by houghing him.

### THE GREAT DESERT OF AFRICA.

THE immense sterile desert of Africa, which equals one-half of Europe in extent, or is nearly three times as large as the Mediterranean sea, is called *Sahara*§, and may be considered as an ocean of sand, having bays or gulfs of lesser deserts branching off from it, and various islands, of different magnitudes, of fertile spots in it, called *Oases*; the largest of these, Fezzan, is 300 miles long and 200 broad; this is surrounded by an irregular ridge of rocks, except on the west, where it is open to the desert. The fertility of this and other Oases arises from their having a comparatively abundant supply of water from wells, supplied from the neighbouring mountains; for very little rain falls here any more than in the open desert. Date-palms are the principal vegetable productions, though the soil and climate are not unfavourable for raising wheat. These Oases are far more abundant on the eastern than on the western side of the Sahara. The Sahara forms only the major part of a still larger tract, extending to the further side of Arabia, and divided by the valley of the Nile and the Red Sea into three unequal portions, for all this part of the globe is of a similar physical character in most respects.

The Sahara, or African part, is estimated at about 2500 miles in length by 720 in average breadth. Its sandy surface is a general character, but this is of different levels. In many places it is quite naked, but generally it produces an odoriferous plant, called by the Arabs *Shé*, somewhat resembling our wild thyme; with this are found other plants, one of which, very thorny, and serving as food for the camel, is the most common.

In some places large flocks of sheep, goats, or even cattle, find a scanty pasture, but more commonly nothing is to be seen but desolate hills of shifting sands; these are termed "deserts without water," a name conveying to an Arab's ear the fearful idea of an intense and suffocating heat, of a total absence of vegetation, and of the hazard of a dreadful death from want of water. The western division is of this nature, and is no less than 1600 miles in length by half that number in breadth, and is, without doubt, the largest desert in the world.

One peculiarity of these plains is the abundance of salt found every where on the surface. Natron (a carbonate of soda,) is also abundant.

Besides the animals already mentioned, the ostrich is found in the Sahara, though more abundant in the southern parts of the continent. Some species of deer, or gazelles, also frequent the fertile spots; but, from the dearth of vegetation, and want of water, the natural history of this desert is very limited.

The persevering energy of man has conquered the obstacles which the Sahara apparently presents to any intercourse between the nations separated by it. From the earliest ages traders have traversed it, by uniting in large bodies, called caravans, and the camel, by its wonderful structure, its strength, docility, and abstemiousness, is the means which have enabled man to effect these journeys, for without it they would be impossible; but even with this auxiliary, and with all the precautions that experience can take, the caravans have frequently to endure the most terrible distress from want of water, for the shifting sands frequently obliterate the land-marks of the route, and delayed by the search for the path, the stock is exhausted before the multitude can reach one of the few and far-distant wells. The dried and bleached corpses and skeletons of the camels and horses who constantly perish on the journey, are the principal guides on many of these dangerous roads.

We have already mentioned the phenomenon of columns of sand raised by whirlwinds, as common to all extensive plains in tropical regions; but those which visit the desert of Africa have been more particularly described from their

\* Captain Head asked a young woman nursing a very pretty child, "who was its father?" "Who knows?" was the reply.

† This is a species of Marmot. (*Arctomys ludoviciani*. Order Rodentia.) It digs holes and burrows; a small speckled snake takes shelter in these holes, and is believed by the Indians to be the dogs' guard.

‡ This animal is not very well known, and it is believed that the name is given to more than one species, they make very extensive burrows with galleries, and live on vegetable food, they are very clean and neat in their habits, they run and do not leap like rabbits, hence it is inferred, that they belong rather to the agoutis or cavis than to the hare tribe; it weighs about twenty pounds.

§ This word in Arabic means Desert.

being better known. The caravans which have traversed these desolate regions from the remotest antiquity, being constantly exposed to their destructive violence. All travellers who have crossed these plains, have described the precursors and the appearance of the storm in similar terms: a more death-like stillness in the air, a lurid light, and those optical phenomena mentioned in p. 36, announce the approach, and the coming clouds of sand are seen in the horizon. If the direction of the wind brings them towards the caravan, and sufficient time is not allowed for escape, the riders, dismounting from their camels and horses, throw themselves flat on their faces, closing the mouth and eyes to keep out the suffocating particles, and the vapour which carries them. The camels instinctively bury their noses in the sand for the same purpose, while the horse, unless inured to it by experience, and trained to take the same precaution, suffers fearfully, if not fatally. When the danger is passed, and the bewildered fainting traveller rises from his constrained position, he often finds all the known landmarks swept away, which were to guide him on his path, his associates dead from fatigue, heat, or suffocation, or if he escapes these calamities, his provisions, his clothes, his stock, are usually much injured, if not destroyed by the sand, which is so subtle and penetrating, as to enter every package, however closely secured and guarded. We have endeavoured to convey an idea of the appearance of a sand-storm and its effects, in the engraving at the beginning of this paper.

#### THE TABLE LAND OF CENTRAL ASIA.

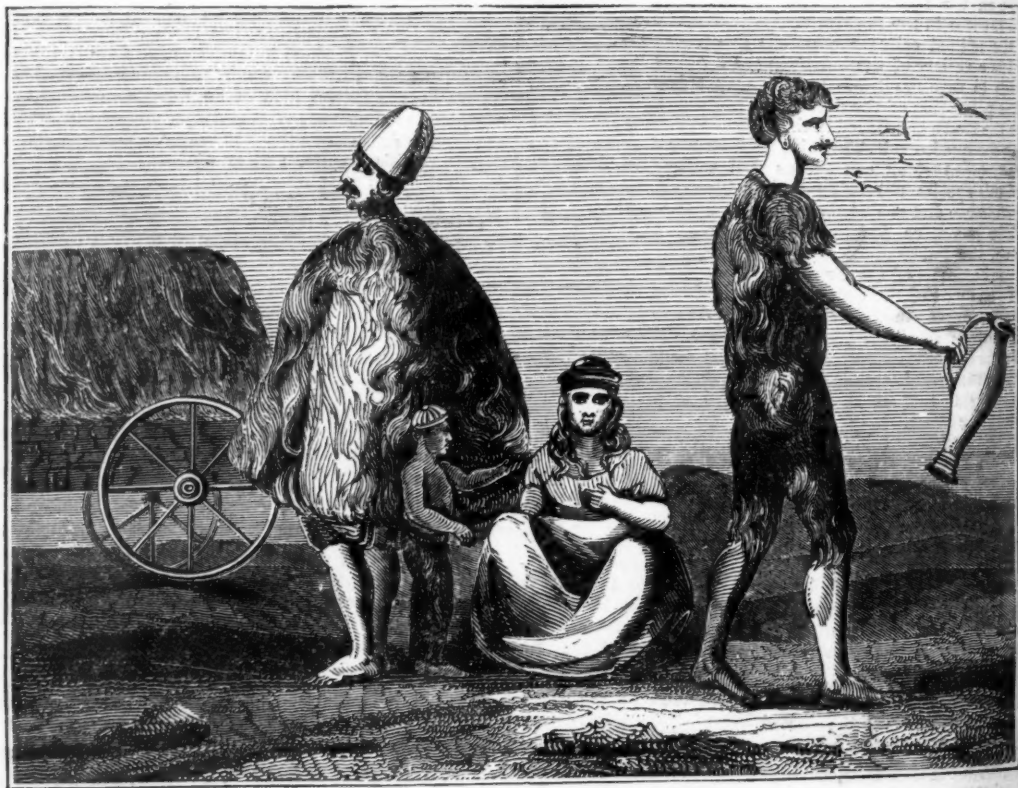
BETWEEN the thirtieth and fiftieth parallels of latitude from the Caspian Sea to Lake Baikal, and from the sources of the Indus to the wall of China, is an immense Table-Land, parts of which are the highest spots, not being mere peaks of mountains, on the globe. Generally it consists of an assemblage of naked mountains, enormous rocks, and vast plains, the principal of which latter is the Desert of Kobi, or Shamo. These table-lands form two distinct tracts, differing in extent and elevation: the most eastern, comprising the plateau of Thibet, and the great desert of Kobi or Gobi, rises from 4 to upwards of 10,000 feet above the level of the sea, and contains about 7,000,000 square miles.

The most western, the plateau of Irān or Persia, is not so elevated or extensive, no where exceeding 4000 feet, and not comprehending more than 1,700,000 square miles. In length, the two together extend about 5500 miles from west to east, and vary in breadth from 700 to 2000 miles.

Unfortunately, little is at present known of the natural history and productions of this country. The climate, from the great elevation, is very cold, yet a vegetation adorns many parts of it, and the wild horses, in large droves, pasture on the more fertile portions. That it was once the abode of numerous and civilized nations, appears from the remains of temples and sepulchres found on some of the mountains. The present Mongolian population are wandering tribes, professing the religion of the Dalai-Lama, and keeping immense flocks of horses, camels, cattle, sheep, and goats, and therefore, plentifully provided with all the necessaries of life, and, indeed, raised far above many other nations in their habits and customs.

The desert of Kobi resembles that of Africa, consisting of a mass of barren sand, incapable of cultivation, and nearly destitute of water from the absence of vegetation.

THE tribes who overran the Roman empire, and came from the East, the Huns, Avars, and Alani, are supposed to have emigrated from this Table-Land of Asia; and some of the Gothic tribes, as they are called, came from a more limited plain of Europe, Jutland, and Denmark, which, though now peopled, yet preserves some of its natural characters, and is marked out by extensive heaths, which still present an obstacle to all cultivation. Why these uninviting districts should have been so apparently overpeopled that emigration was rendered necessary, when the rest of the known world was comparatively under-populated, is a mystery in history which there is no means of fully explaining: it may be partly accounted for by the peculiar nature of the physical geography of this central region, which presents facilities of communication, and varieties of soil and climate, favourable to the spread of population. Its present comparative solitude is due to moral causes, to which we have not space to do more than allude.



INHABITANTS OF THE STEPPES OF ASIATIC TARTARY.